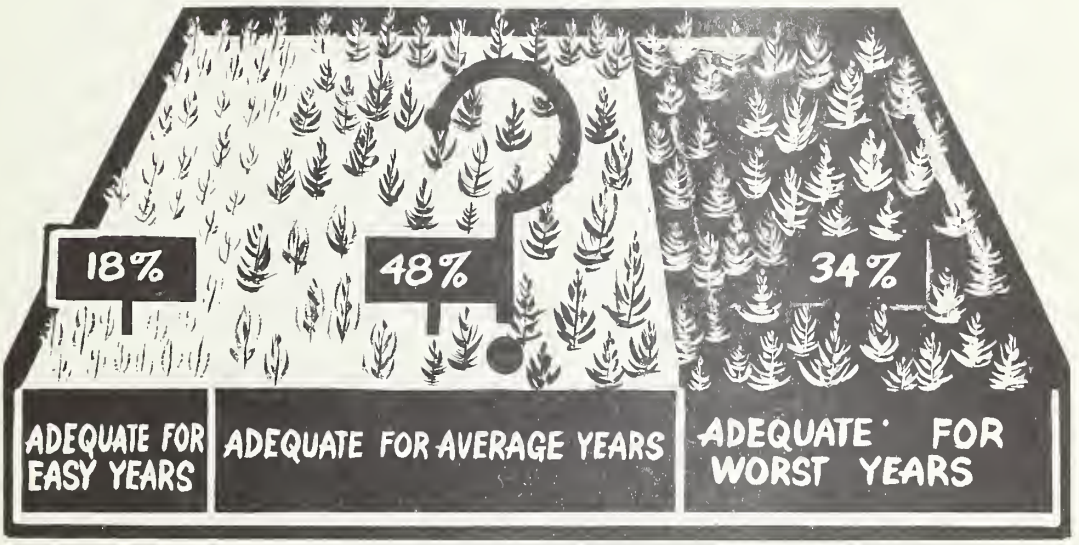
FIRE CONTROL OBJECTIVES and STANDARDS

by Loyd LaMois



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FIRE CONTROL OBJECTIVES AND STANDARDS[1/]

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It is a disturbing realization that, for the most part, public forest fire control organizations have no well-defined objective or clear-cut set of specific, rational goals to shoot at. Few, indeed, are the fire control administrators who can quote an established and working goal toward which they gear the structure and methods of their fire control organizations. Those who are "blessed" with such policy directives to guide them will seldom venture their conviction that these accepted goals have behind them much more than tradition.

Fortunately, the tradition is a proud one--motivated by the finest sense of public stewardship and a selfless devotion to a seemingly endless chase. (You will note that I did not say "hopeless" chase--it is just that refusal to look at the forest fire problem as a "hopeless cause" that has brought us so far along the way toward adequate fire control.)

1/ Presented at a meeting of the Region 9 Fire Control Committee, Feb. 11-12, 1958.

2/ Maintained by the Forest Service, U. S. Department of Agriculture, at St. Paul 1, Minn., in cooperation with the University of Minnesota.

But here is the question: "What is adequate fire control?" The time is here when we must pause a little and try to come up with a few meaningful answers. H. W. Beall of the Dominion Forest Service in Canada could not help but marvel a bit that during the first 40 years the only apparent policy around which Canada was building her fire control organization was "keep fire losses as small as possible." He went on to say about Canada (and I am sure that it also applies to the U.S. during comparable stages of fire control efforts) that this was a satisfactory, if somewhat vague, definition when the means, facilities, and accomplishments fell far short of any acceptable standard.

What is an acceptable standard? The diagram data show that 48 percent of the Lake States territory is adequately protected under "average" weather conditions and 34 percent adequately protected under "worst" weather conditions. Is the "adequate" on this chart based on fire damage in dollars, on total burned acreage, or number of large fires? A more important and basic question--will the same fire statistics spell out "adequate" 10 or 15 years from now? I am sure that the present standards of adequacy would, 40 years ago, have seemed a wild pipedream impossible of realization.

Three possibilities exist: (1) We have come too far--this "adequate" protection is buying us more than we need at too great a cost; (2) we have reached what we are striving for--"adequate" protection (as represented in the chart) is furnishing us with just

what we need in fire protection; and (3) we have not come far enough--our losses today must be cut down so that our protection will be considered adequate 10 years from now.

We may all wish we could convince ourselves that we are still in that first "40-year" period, and that we can justly postpone for a while any tortuous thinking this question demands. However, I am sure that you are honest enough with yourselves to realize that this is not the case. The time has come for a hard look at where we are and some weighty thinking on where we want to go from here.

It would be foolish for me to pretend to indicate an answer. The helplessness I feel when trying to even suggest a rational start is what panics me. But in this talk, I want to do three things: (1) Go over, briefly, a little bit of the original thinking on the subject by some of the "pioneers", and try to trace the evolution of a few expressed goals of which we are already aware. (2) Suggest two or three "common denominators" that run through all of the examined background. (3) Try to start a little cross-table talk on the subject.

One thing I did learn from my preparatory reading for this assignment. All of us should reread and digest thoroughly some of the so-called "classics" in this literature. A lot of water has run under the bridge since Show and Kotok, Gisbourne, Hornby,

DuBois, Headley, and others of the pioneers first studied these problems and put their ideas on paper; but much of what they wrote is fundamental and basic to the same questions we face today. Especially noteworthy is their purposeful use of fire statistics. They did not accumulate fire records merely for the sake of compilation and publication--they started with a definite question in mind and set about getting an answer by systematically analyzing past fire records.

I mention this at the start because of a fact that may not be fully appreciated. It is this: These men were researchers. These first exploratory investigations, which relied mainly upon analyzing and interpreting past records, were products of research effort rather than compilations for administration purposes. Since that time, the responsibility for maintaining and using forest fire records has, I feel, tacitly passed into the hands of the administrators. This is as it should be--research to provide the leads and methods, and administration to put them into fruitful use.

The problems were not solved with the writings of these earlier men--they merely pointed the way. It is up to us who follow to examine their basic approaches, and to use what we can of them in arriving at our definition of adequate fire protection.

S. B. Show and E. I. Kotok,[3/] in an early publication, voiced the two principal theories concerning the objective of fire control which had been propounded prior to 1923.

1. To hold damage by fires to a reasonable, accepted minimum. (This "accepted minimum" was a burned acreage figure below which it would be impracticable to aim at.)
2. To keep the total cost of protection plus damage at a minimum amount. (Least cost plus loss theory.)

Actually, the second of these was merely a refinement of the first one--"economics" being brought into the picture as a sort of brake against "overprotecting" some of the less productive lands.

It was under the objective of keeping fire losses to an accepted minimum that the U. S. Forest Service developed and finally knitted a fairly well-standardized fire control organization, described in DuBois' protection manual of 1914. The efficiency of organization was largely measured by the acreage burned until the "economic" theory was first expressed in 1916. The "economic" theory, however, has its weakness which, as we shall see later, led to its disuse as guiding policy in the U. S. Forest Service.

3/ S. B. Show and E. I. Kotok. 1923. Forest fires in California 1911-1920, an analytical study. U. S. Dept. Agr. Dept. Cir. 243, 80 pp., illus.

Show and Kotok pointed out, in their analysis of California fires from 1911 to 1920, that total damage and suppression costs of any given group of fires increases with the size of the average fire. They refined this concept by carrying it into terms of Class C (or bigger) fires. Obviously the size of average fire would increase as did the proportion of Class C fires to the total number of fires. The authors carried their analysis one step further--they showed that as the proportion of Class C fires increases, so too does the probability of any one of them turning into a major "project" fire. In other words, when out of 1,000 fires during a season only 100 (10 percent) are Class C fires, about one out of 40 of these (or 2 fires) turns into project fires. But when 300 (or 30 percent) are Class C fires, something closer to one out of 10 (or 30 fires) can be expected to develop into projects.

They conclude "...the reduction of Class C fires to a low proportion of the total is an important and practicable objective."

Incidentally, they found out from examination of records that slowness of initial attack is responsible for twice as many poor results as is faulty or inadequate action after arrival. Findings such as these should guide fire control agencies into giving added emphasis to problems involving detection and mobility.

Show and Kotok, in a later publication,[4/] stated, "The simplest and most useable statement of the fire control objective is in terms of acreage burned." The Dominion Forest Service of Canada, in formalizing their protection plans (circa 1949), base their planning on this concept. Starting with the premise that the most sound, basic measure of fire damage is burned area, their Dominion-wide plan is actually a very sophisticated application of this Show-Kotok concept. They have divided the forest lands of Canada into 13 broad zones based on a number of geographical factors including climate and land use. Within each of these 13 zones the land is mapped into 1 of 5 classes or types. These are: (1) experimental areas, (2) recreational forest, (3) productive timber areas, (4) nonproductive forest, and (5) nonforested.

Within each zone, then, a burned area objective is determined for each of the five land types. The actual calculation of these burned area objectives is too complicated to describe here, but involved are such factors as values protected, costs of rehabilitating burns, costs of protection, and so on.

Then, working from fire records, the Canadians translate their burned area objectives into acceptable average size of largest fires. This is a variation from, but could just as easily be,

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4/ S. B. Show and E. I. Kotok. 1930. The determination of hour control for adequate fire protection in the major cover types of the California pine region. U. S. Dept. Agr. Tech. Bul. 209.

an acceptable proportion of Class C fires. At any rate, each field unit has a definite goal to shoot at, and this policy goal they interpret in terms of elapsed time and strength of attack according to the immediate situation on their own district.

Earl Loveridge, then assistant chief of the Forest Service, U. S. Department of Agriculture, gives a good history of Forest Service policy in the August, 1944, issue of the Journal of Forestry. He relates of the breakdown of the "least cost plus loss" theory in the early 1930's. Many disastrous fires suffered throughout the western United States during that time were attributed directly to results of policy that encouraged "skimpy" efforts on fires burning in less productive areas. A meeting of the Regional Foresters and Station Directors resulted in the "first work period" control policy, which was formally established in a letter from Chief Silcox' office on May 7, 1935. Under this directive it became the aim to control every fire during the first work period or before 10 a.m. the following day. Some think that this is an unrealistic goal and that varied forest conditions make it impossible to apply universally. Because of frequent need for individual discretion in applying this goal, it is felt, by some, to be "no rule at all."

Three things appear to me as being constant throughout this background of experience: (1) Where policy emphasis is on low cost, the results may be poor. (2) To control fires when they are

small is essential to any policy of operation. (3) Consistency of performance is a criterion of successful protection.

This last factor, consistency, warrants an additional few comments. To yield consistent results--in good years and bad, an organization has to be elastic. This elasticity demands the development of reliable forecasts of weather and risk, and it also must inevitably demand the integration of fire control into overall forest administration.

Summary

The question "What is adequate fire control?" has become increasingly important as our fire control organizations have grown and matured. Early thinking on standards of protection holds much that is still valid today. Fundamental concepts and basic approaches developed in past years open avenues of rational attack on the present problem of determining what the specific goals of protection effort should be.

Several broadly stated goals have been mentioned, involving a variety of parameters. Some of these are:

1. Holding total burned acreage down to an acceptable minimum practical amount.
2. Holding to a minimum amount, the total cost of fire control plus the damage from fires.

3. Reducing the number of Class C (or larger) fires to a set low proportion of the total.

   or (a variation of above)

   Reducing to a predetermined value the average size of the larger (Class C and larger) fires.

4. Holding total acreage burned to a value below a predetermined "maximum allowable burn".

5. Extinguishing any and all fires within the first work period.

6. Reducing the total number of fires occurring to a set goal.

Each of the above bases for protective effort has its individual merits when examined in the light of fire statistics. None of them, however, has proved to be a complete and satisfactory goal in itself.

Successful fire protection requires first and foremost a determination and statement of a specific objective. Staffing, training, equipment, and methods all must be geared to a well-understood, specific goal. Further, this goal must be defensible in regard to meeting our responsibilities in public land management, and doing so within the bounds of reasonable expenditures.

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